Amendments to the Drawings:

Attachment: Replacement Sheet

REMARKS

The Office Action mailed April 28, 2008 has been carefully considered by Applicant. Reconsideration is respectfully requested in view of the foregoing amendments and the remarks that follow.

Drawings

The drawings have been objected to under 37 CFR §1.83(a) as failing to show a label on the box denoted with reference number 10. By the present Amendment, drawing figure number 1 has been amended to include the word "sensor" on the blank box 10. No new matter is added by this amendment, as the function of the box 10 was clearly described in the application as filed, see e.g. page 6, lines 1-4.

Drawing figure 1 has also been amended to include boxes representative of a processor (e.g. the signal processing device described on page 6, lines 5-8 of the application as filed) and a display (e.g. the diagram 12 shown in figure 2). No new matter is added by these amendments.

Claim Rejections Under 35 U.S.C. §102

Claim 1 has been rejected under 35 U.S.C. §102(b) as being anticipated by Goebel et al U.S. Patent No. 6,757,668. By the present Amendment, claim 1 is cancelled and new claims 5-16 are added. Claims 5-16 are believed to fully distinguish over Goebel et al '668.

The present application relates to a system and method for identifying a condition called "rotating stall" in a turbine and factoring such a condition into estimation of the remaining operational lifetime of the turbine. As mentioned on page 2 of the application as filed, rotating stall may cause overloading of the turbine blade with subsequent damage and compressor breakdown, without the condition be detected by equipment and methods according to prior art. Rotating stall is explained in the application as follows.

> Rotating stall can occur in a turbine stage when the air approaches the turbine blade at the wrong angle. This may cause the flow to separate in the boundary layer between blade and air (boundary separation), whereby a varying flow is generated at one or more locations along the periphery of the stage. When a first turbine blade is subjected to this condition, the air flow is deflected towards a nearby turbine blade, which

> is then overloaded while the other nearby turbine blade is relieved. This causes the overloaded turbine blade to be subjected to stall, whereby the first turbine blade is relieved. Thus rotating stall propagates along the periphery of the stage at a speed of approximately half the speed of rotation of the turbine.

Prior art methods and systems for estimating the remaining operational lifetime of a turbine do not account for rotating stall and instead simply include steps taken to measure the performance of the turbine. Goebel et al '668 follows these prior art methods. Goebel et al '668 does not relate whatsoever to detection of rotating stall and certainly does not consider the step of factoring an identified condition of rotating stall into an estimation of the operable life of a turbine blade in the compressor.

Claim 5

Claim 5 recites a method of estimating the operable life of turbine blades in a compressor. The method includes the steps of correlating sensed vibrations in a compressor casing to a frequency value representative of the vibration frequency of the casing. Thereafter, a condition of rotating stall is identified by determining when the frequency value is outside of a known range of frequency values of the casing during normal turbine blade operation. The condition of rotating stall is then factored into an estimation of the operable life of a turbine blade in the compressor.

As stated above, Goebel et al '668 does not relate whatsoever to detection of rotating stall and certainly does not consider the step of factoring an identified condition of rotating stall into an estimation of the operable life of a turbine blade in the compressor. The passage in Goebel et al '668 cited by the Examiner, including column 16, lines 31-37, merely teach a vibration analysis (VIBE) which detects the amount of vibration within an engine to determine damage which may be caused by the existence of excessive vibration. This is far removed from the claimed invention. That is, while Goebel et al '668 teaches the basic concept of "sensing vibrations", it does not teach any of the remaining elements of claim 5. As such, claim 5 is believed allowable over Goebel et al '668.

Claims 6-8

Claims 6-8 depend directly or indirectly from claim 5 and are thus believed allowable for the reasons stated above, as well as the detailed subjected matter recited therein.

Claim 9

Claim 9 recites a system configured to estimate the operable life of turbine blades in a compressor. Among other things, the system includes a processor configured to receive a measurement signal from a vibration sensor and to correlate the measurement signal to a frequency value for a casing of the compressor. Further, the compressor is configured to identify when the turbine blades are subjected to a condition of rotating stall and to thereafter communicate such a condition to a lifetime estimation tool for estimating the operable life of turbine blades in the compressor. As discussed above, these aspects are neither taught nor suggested by the cited reference, which does not even recognize or otherwise address the problem of rotating stall within a turbine.

Claims 10-16

Claims 10-16 depend directly or indirectly from claim 9 and are thus believed allowable for the reasons stated above, as well as the detailed subject matter recited therein.

Conclusion

The present application is thus believed in condition for allowance. Such action is respectfully requested.

Respectfully submitted,

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